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POPULAR AND PRACTICAL ENTOMOLOGY.

FRAGMENTS IN THE LIFE-HABITS OF MANITOBA INSECTS.

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Field work such as is carried on by the staff at an entomological laboratory naturally presents many opportunities for insect studies apart from the major problems for which the laboratories were primarily established. Thus the odd hours when more important matters are temporarily absent, or the less frequent occasions provided by the stops between trains, present opportunities for numerous minor studies resulting in the accumulation of various more or less disjointed notes which under ordinary circumstances remain unpublished. As such notes might well prove of interest to others, I have taken advantage of the Editor's request for an article to bring a few of them together under the above heading.

Pœcilopsis (Apochiema) rachelæ Hlst.

This moth has usually been considered rare but in reality is probably more numerous than is generally supposed. It appears quite early in the spring at the time when the first willows are flowering, though I have never observed it actually resting upon the flowers. It becomes active at the time when the beauties of sunset are darkening into twilight, and for that reason we christened it "the Twilight Moth." At that time the male moths may be seen flying in a jerky, up and down flight not unlike that of the buck moth (*Hemileuca*) and if we watch carefully, the hovering of the male over a certain spot will occasionally reveal the wingless female. The latter, however, is very difficult to find, and more often than not its discovery is due to accident rather than to search. The females have been found resting upon the ground, on the trunks of trees, or on the smaller twigs of shrubs such as willows. Aspen poplar appear to harbour them most frequently, possibly because the moth shows a wonderful colour resemblance to the bark. Willows, too, are often chosen for resting places, and here again the little bundle of fluff, of which the female moth reminds one, is very like a pussy willow.

The life-history of *Apochiema rachelæ* was described in the Canadian Entomologist by Mr. Arthur Gibson, Vol. XLV, No. 12, 1913, but the egg-laying habits, of which the strange ovipositor had occasioned considerable speculation, remained in some doubt at the time, and the observations which eventually filled the gaps have remained unpublished since 1915. In that year a female *Apochiema* was found running actively along the ground in broad daylight on April 13, having probably been disturbed by the building operations taking place close at hand. She was placed in a cage in which a goodly number of twigs, rotten wood, sods and other objects were added for ovipositing purposes. During the day time she remained quiet, but as the shades of evening approached she became active and was used to lure males within reach. Later it became evident that she was seeking a suitable situation for her eggs, and as she showed

little concern for the dimmed light of a lantern, I was able to watch her movements without in any way interfering with her work. Thus, she was seen to run actively about the cage, climb up and around the various twigs, and when a promising crack appeared test its possibilities with her ovipositor. Eventually reaching a dead twig containing loose bark she became greatly excited, and before long had thrust her ovipositor behind the bark between a crack and deposited an egg upon the wood beneath. Then moving to another spot she repeated the performance. Many of her efforts to reach a favourable situation were, however, without avail, and while she seemed to object strongly to placing more than one egg in the same place, the scarcity of appropriate cracks elsewhere invariably induced her to return to the original twig. It thus happened that while she searched over every object in the cage with great care her entire clutch of eggs was ultimately placed in the one twig. In all about 40 eggs were deposited. These, as was to be expected, were somewhat bunched though no egg actually rested upon another, and all were well hidden by the overhanging bark.

The foregoing observations provide strong evidence to show that the eggs of *Poecilopsis rachelæ* are not laid in masses as was previously supposed, but instead are deposited singly or at most in small numbers. They are placed beneath the dead loose bark, probably on those twigs so commonly found attached to the lower stems of aspen poplars or upon willows which provide many similar conditions.

This will, of course, explain why the larvæ are generally found singly and have a diversity of food plants. It also accounts for the remarkable agility of the female moth and the activity of the young caterpillars.

Eggs from the above-mentioned moth hatched on May 10–11, and moths from the resulting pupæ on April 20 of the following year. A majority of the adults were, as usual, females.

Leucobrephos brephoides Wlk.

The remarkable earliness at which this moth makes its appearance in springtime has often occasioned speculation as to whether or not it was able to force its way through the snow. The adults have frequently been observed flying and were captured too, while the woodlands still rested under a thick covering of snow and only the extreme uplands were free from its mantle. This seemed strong circumstantial evidence in favour of the supposition that the moths did make their way, though the small amount of visible land always left a doubt as to whether this was actually so or not. In 1916, however, evidence of a direct nature became available, which left no doubt as to the moth's habits in this respect.

The spring of 1916 was an unusually late one in Manitoba, while the winter preceding it had provided an abnormal amount of snow. Thus up to April 10 no land was visible anywhere, and the woodlands among which *L. brephoides* is known to breed presented a solid covering of approximately two feet in depth. Odd thaws had occurred, however, and once the temperature rose to 44° F. in the shade, so that the snow was actually in a thawing condition. The first moths were seen flying on April 1, and during the succeeding days were observed frequently up to the 10th, some of which we captured. As a rule these moths were noted resting upon bunches of straw, hay or some other material dropped

along the trails, and it was only on the warmer days that they appeared on the snow itself. One of these latter captures, however, presented unmistakable evidence of having recently emerged as it had not yet reached the state when active flight was possible, the wings being soft and not fully developed. It has been suggested that the larvæ of this moth might pupate in the dead, partly rotten wood as *Brephos infans* is supposed to do, and so perhaps lie above the snow line. Breeding experiments have failed, however, to show any indication of this. Moreover, the open woods in which *L. brephoides* breeds were in the above instance practically free from necessary dead material. Perhaps not the least interesting point in this moth's habits is the fact that it emerges when the temperature registers but a few degrees above freezing and while the ground upon which the pupæ rest must be very close to the freezing point. The moth, however, is thickly clothed with hairs which doubtless help to protect it from the cold.

Hemileuca lucina var. **latifascia** B. and McD.

This moth is by no means uncommon in the sand dunes near Aweme, Man. The handsome black and yellow caterpillars are at first found in bunches feeding upon the low shrubby aspen poplars and later as they attain maturity, scattered singly upon the same type of vegetation. They are often heavily parasitized and, in consequence, the moths only appear in large numbers at intervals of several years. The moth is an unusually handsome one, and its jerky, up and down flight, from whence it gets the name "buck moth," makes it an object of particular interest, flying as it does in broad daylight and during the finer days of autumn. For a long time we found difficulty in securing them. Then in a moment a secret was revealed to us whereby the males were collected with little effort. The moth is, of course, a day flier so that light traps are out of the question; yet, strange as it may seem, fire still provided the attractant, though in a totally different way. The means adopted to obtain the desired end were extremely simple and consisted of lighting a small fire from which sufficient smoke issued to drift "down wind" for about half a mile; in other words, to make a smudge of some dead grass and leaves. Then the collectors would calmly sit near and await the coming of the moths, nor were the latter long in appearing. A moth would be seen dodging backwards and forwards across the smoke as if seeking the strongest part of it, but at the same time steadily moving nearer to its source. Soon it was hovering over the fire and shortly after found a resting place in a convenient cyanide bottle. Others quickly followed, perhaps two or three at once, and the sport became fast and exciting. From what distance these moths came is unknown, but doubtless it was from as far as the smoke remained fresh. A bright, sunny day with a breeze sufficient to keep the smoke low provided the ideal conditions. We noted that these moths came towards the fire without hesitation, and that they invariably flew towards its source as if recognizing at once from whence it came. When actually over the fire they hesitated, hovered over it, and at times flew directly into the flames; on other occasions they recognized the heat sufficiently soon to enable them to "make off" before being injured.

From the fact that only males were enticed it would seem as if the smoke provided some odour or other attracting properties reminding the male of the opposite sex rather than of food. But whether this is so or not cannot

be definitely settled at the moment. The habit, however, provides an instance of how the males of this moth might be destroyed in large numbers were they ever to become a pest. Unfortunately the females are not attracted in this way, and it is on them after all that the perpetuation of the species depends most.

My brothers and I have since attempted to lure other insects by similar methods, but our efforts for a long time were without avail; indeed, so far as one could judge, most insects had a decided objection to the smoke. Later, however, we found that we had been actually associated with another insect that came persistently though doubtless from a very different motive from the *Hemileuca*. An account of this is given under the next heading.

Musca domestica Linn.

The common house-fly needs no introduction and it has been dealt with so frequently, both scientifically and popularly, that one can hardly expect to add much to what has already been written.

Our first experience with the house-fly as attracted to camp-fires was many years ago. We thought then that it was the savoury smell of a roasting grouse that induced the gathering, and I am not prepared to say even now that this was not, in part, the case. Later, however, we discovered that the flies came almost, if not quite, as readily when no cooking was in progress. But the climax was reached when we attempted to drive the pest from a building by smoking it out and after being forced out ourselves and permitting the smudge to modify, found to our astonishment that the flies were thicker than ever inside as if waiting a promised feast. It seemed to matter little where the fire was started, be it in the wilds far removed from habitations or close around the farm yard, the smoke no sooner had time to spread than along came a house-fly and soon a small procession was seen rapidly beating "up wind." Unlike the moth described above the flies did not fly directly into the fire, but instead seemed to use the smoke merely as a guide that led to other objects more attractive. Further observations convinced us that smoke constituted an invariable attractant for these insects. We also noted that a frequent method of entering a house, namely, by means of a chimney was only utilized when a fire provided the necessary smoke, and not to any noticeable extent when heat alone issued forth. Thus the contention that the attraction was in reality heat and not smoke, does not seem to be warranted from this evidence, and while the gathering of flies around screen doors and windows is doubtless, in part, due to warmth it may also be largely influenced by the smells from within, including smoke. Our experiments in the field, in which we provided a maximum quantity of smoke with a minimum amount of heat, in every way confirmed our previous observations as to smoke being the true cause of the attraction. It might be asked why should flies be drawn to smoke and follow it to its source. What does smoke usually foretell? A habitation or camp fire and these in their turn, man and food. Is it not possible that this reasoning acquired from long association with mankind, has become part of the fly's instinctive nature? It seems so to me, but I am content to let others judge. In any case, there are opportunities for some interesting experiments along the lines of this study which would seem well worth while.

Cicindela limbalis var. **awemeana** Casey.

This insect, in its adult state, is usually found on semi-moist roads, on similar moist areas along river banks or on pocket gopher hills in openings among semi-wooded areas. In autumn it seeks rather higher situations in which to hibernate. The larvæ occur in much the same places as the beetles, but are more easily discovered on the old gopher mounds that have become firm through the combined action of snow, rain and time.

In 1916, I came across a single gopher hill on quite high ground in which were no less than 16 burrows, most of which contained almost mature larvæ. These were marked for further observation and on August 8th dug up. The result showed 11 beetles about to emerge, 5 empty holes from which adults had issued, several parasite cocoons and a dead larva from which were coming numerous minute hymenopterous insects which were secured. These latter were afterwards determined by Mr. Girault, through the courtesy of Dr. Howard, as *Tetrastichus microrhopala* Ashm. There was also one living larva which would undoubtedly winter over and become a beetle the following year. Pupal cells were always either in, or very close to, the larval burrow and the average length of the two combined was three inches, while the deepest slightly exceeded four inches, and the shallowest two inches. The single larva had a burrow measuring four and a half inches, which represented the height of the gopher hill. This seems to be the usual depth even in winter time, as the larvæ, apparently, are unable to dig through the sod found below the mounds.

The beetles are also content with shallow winter burrows which seldom exceed a foot in depth.

Eleodes tricostata Say.

While investigating wireworms in grain fields during 1915, a new form of injury was noted which, in many respects, resembled the work of cutworms. This on close inspection, I traced to an active wireworm-like larva having indeed a close superficial resemblance to a true wireworm, but showing structural characters which placed it among the *Tenebrionidæ*. Specimens collected were about an inch in length, shiny, brownish-slate in colour above, with a blackish head, a light undersurface and a dark stripe along the ventral side. Pupation took place about August 18 and adults emerged the second week in September.

The habits of these *Eleodes* larvæ closely resemble those of ordinary cutworms, *Euxoa* spp. They appear above the ground at night, run actively about until they locate a suitable plant for food purposes, and then usually devour the leaves above ground, but at times, cut the stem off close to the surface. Their method of attack is generally told from that of cutworms by the plant being eaten above ground instead of being partly dragged under and eaten from below. The larvæ are very general feeders. In a wheat field they preferred lamb's quarters but ate wheat plants readily also. In captivity they feed upon various plants including red-root, pigweed, lambs' quarters, Russian thistle, tumble weed, Russian pigweed, wild buckwheat, hares-ear mustard, tumbling mustard, cabbage, turnip, beets, wheat, oats, barley and rye. It is also noteworthy that bran was consumed readily. Hence, there is reason to expect that the usual poisoned baits as used for cutworms would prove equally efficient in the control of this insect.

NOTES ON THE GENUS *OLENE* WITH DESCRIPTION OF A NEW SPECIES.

BY WM. BARNES, M.D., AND J. McDUNNOUGH, PH. D., DECATUR, ILL.

In our Contributions, Vol. IV, No. 2, p. 129, we called attention to two distinct species of *Olene* larva found in Maine; the one we identified as that of *vagans* B. & McD. and the other as *willingi* B. & McD. This latter identification was, however, an unfortunate error on our part; at the time we had only the single ♂ type of *willingi* before us, a rather suffused, poorly marked specimen, but later Prof. Willing was kind enough to send us for examination the co-type and the larva from which the figure in our revision of the genus (1913, Contr. II, (2), Pl. V, fig. 5) was made. These proved conclusively that our identification of the Maine larva as *willingi* was incorrect and that our treatment in the revision should hold. From information received from Mr. T. Spalding, of Provo, Utah, concerning the larva of *grisea* B. & McD., we believe that this name also for the present must remain associated with *vagans* as the two larvæ agree in lacking the dorsal hair pencil on segment XI; in any case *grisea* cannot be associated with the Maine species which we wrongly called *willingi*, the larva of this being at once separable by the presence of the aforesaid dorsal hair-pencil.

Mr. W. H. Brittain, Provincial Entomologist of Nova Scotia, is about to publish a Bulletin on the life-history of *vagans* which obviates the necessity for any further remarks on our part concerning this species.

During the summer of 1918 Dr. McDunnough was fortunate enough to discover eight more larvæ of the second *Olene* species on oak and beech trees in the vicinity of Ottawa, Ont.; these agreed exactly with the specimen found feeding on hazel the previous summer in Maine and eventually hatched out into three ♂'s and five ♀'s; the ♂'s agreed well with the Maine specimen figured in our Contributions,. Vol. IV, Pl. XX, fig. 7; the ♀'s proved to be identical with our ♀ type of *vagans*, a fact which we had already hinted at in our notes (1. c. p. 129) when restricting the type of *vagans* to the ♂ specimen. As the species is without a name we offer the following description based on our Ottawa material.

Olene dorsipennata, sp. nov.

♂.—Head, thorax and primaries rather even, dull, greenish gray; a straight black basal half-line; t. a. line broadly geminate, angled outwardly slightly in the cell, strongly in the fold and again immediately above inner margin, the included space partially filled with brownish shading; reniform of the usual broad lunate shape, incompletely outlined in black with traces of white shading within and around the edges, but much less prominently than is usually found in the group; t. p. line irregularly dentate, slightly bulging opposite the cell and strongly angled inwardly above inner margin, followed by a diffuse, dull liver-brown subterminal shade which in turn is bordered outwardly by a poorly defined whitish shade, most prominent as a small, white patch above anal angle; an irregular terminal black line slightly interior to the outer edge of wing, especially at anal angle; fringes greenish-gray, faintly checkered outwardly with pale ochreous. Secondaries dark smoky with faint traces of a darker subterminal line. Beneath smoky gray, darker in cell of primaries with large discal dot and diffuse subterminal line on all wings. Expanse 37 mm.

♀.—Similar in coloration to the ♂ but with the brown shading before the t. a. line and beyond the t. p. line more prominent; the reniform is contained in a distinct white patch and the black terminal line is bordered inwardly with white. Expanse 50–55 mm.

Holotype.—1 ♂, Chelsea, Ottawa Co., Que. (July 8–14.)

Allotype.—1 ♂, Chelsea, Ottawa Co., Que. (July 8–14.)

Paratypes.—1 ♂, 2 ♀'s from same locality, and 1 ♂, 2 ♀'s from Aylmer, Que.; all in Coll. Barnes.

We have already noted (l. c. p. 129) the points by which this species may be separated from the very similar *vagans*, but we must confess that, without a knowledge of the larva, in many cases a definite identification is practically impossible. There is considerable variation in the species, especially in the ♀'s; these tend to show an indistinctness of maculation, combined with a diffusion of the pale shades, which gives a general washed-out appearance to the specimens and is quite characteristic of the species. As regards the larva we have nothing to add to the description we published under the name of *willingi* (Contr. IV, (2), p. 130); we have taken the caterpillars on oak, beech and hazel and have found the empty cocoons on poplar so that the range of food-plants appears to be wide.

Of the *Olene* species feeding on deciduous trees we now definitely know the larvæ of *meridionalis*, *vagans*, *leucophæa*, *atomaria* and *dorsipennata*. Of these *meridionalis* and *vagans* are very similar and it may be, when the connecting link, *basiflava*, from the Southern New England States is known, that these three forms will be regarded as races of one species rather than as distinct species. It should not be hard for some of our New England collectors to settle this question as the larvæ are quite readily found by searching the trunks of trees in the day time; in most instances they are partially concealed in crevices of the bark. Beating in the early morning or at dusk is also productive of good results, especially in a neighborhood where the species has been definitely located.

The following table may be used as a means of separation:

Larva entirely ochreous.....*leucophæa*.
Larva gray or brown
With lateral black hair pencils anteriorly only.....*atomaria*.
With lateral black hair pencils anteriorly and posteriorly
With long dorsal black hair pencil on Segment XI....*dorsipennata*.
Without hair pencil on Segment XI.
Dorsal tuft on Segment XI broad, brown; many black, plumed hairs from lateral tubercles.....*meridionalis*.
Dorsal tuft on Segment XI narrow, blackish; only one or two black plumed hairs from each lateral tubercle.....*vagans*.

Concerning the pine-feeding Olenes Dr. McDunnough was successful in securing a number of the larvæ of *plagiata* by searching pine trunks in the vicinity of Ottawa the last week in May; they were then full grown, pupating in about a week and producing the adults in early June. Mr. J. M. Swaine, of the Entomological Branch, Ottawa, brought in two young larvæ of the same species in June, obtained by beating young pine trees in the vicinity of Ft. Coulonge on the Ottawa River; one of these fed up and produced the adult in August;

the other hibernated half-grown, and is at the time of writing commencing to feed again. It is evident that at least a certain proportion of the larvæ hibernate twice; in the case before us this took place in a slight web uniting two or three pine needles to form more or less of a protective covering; whether this is the natural method or whether the larva descends to the ground ordinarily is unknown to us.

Plagiata larva is gray with a decided yellowish tinge; the dorsal tufts on abdominal segments 1–4 and 8 are deeper mouse gray, intermingled with plumed white hairs; there are also lateral black hair pencils anteriorly and posteriorly as well as a single dorsal pencil arising out of the tuft on the 8th abdominal segment; the dorsal tubercles on the remaining segments show a rosette of short plumed white hairs and a number of longer slightly barbed yellowish hairs; the supra- and subspiracular rows of tubercles are very similar but contain in addition a single (occasionally two) long black plumed hair. Subventrally there is a fairly heavy clothing of long whitish, bipectinate hairs; the eversible dorsal glands are coral red.

Judging by the description given by Dr. Dyar of the larva of *pini* (1911 Proc. Ent. Soc. Wash., XIII, p. 19) the two must be very closely allied and may even be identical; however, as we have had no opportunity for a careful examination of either the larvæ or the adults of Dr. Dyar's species the two names may stand for the present as given in our Check List.

KIRBY'S INSECTA: VOL. IV FAUNA BOREALI-AMERICANA. RESTRICTION OF AN INDEFINITE LOCALITY.

BY ALBERT F. WINN, WESTMOUNT, QUE.

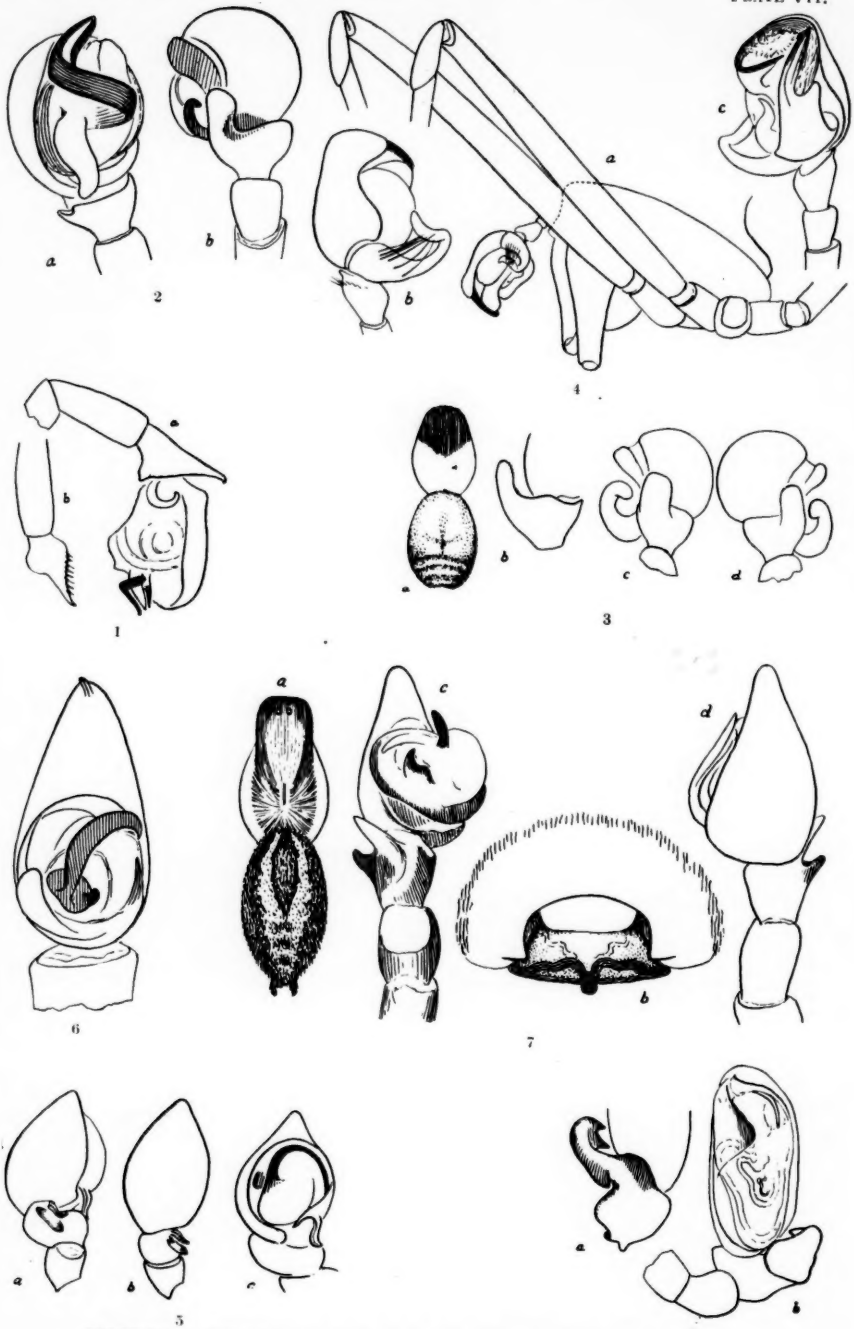
Anyone who has occasion to consult this volume about Canadian Insects can hardly fail to notice the oft-recurring words "Taken in Canada by Dr. Bigsby," and will probably lay the book down wishing that the author had been more definite in quoting localities. While Canada in 1837 was of a very limited area compared with our country at the present day, it was of large extent.

Some months ago, having an enquiry as to what part of Canada, in my opinion, the types of a species of butterfly described in this volume probably came from, I tried to get a little light on the subject. The introduction to the work conveys nothing further than acknowledgement and thanks to Dr. Bigsby, of Newark, and Capt. Shepherd, of the Royal Artillery, for records for Canada, and to Dr. McCulloch and Capt. Hull for those of Nova Scotia.

In the Redpath Library of McGill University, however, there are three books by Dr. Bigsby. In one of these, entitled, "The Shoe and Canoe," by John (Jeremiah) Bigsby, D.D., late Secretary to the Boundary Commission, published in London 1831, I find the following: "Both my duty and my pleasure took me out of the common track————to Lakes Simcoe, Huron, Superior, etc., into a portion of Hudson's Bay and up the River Ottawa into Lake Nipissing as well as to the rarely visited Highlands of the St. Lawrence below Quebec."

It would seem safe to limit the locality "Canada" to the districts above mentioned, and wide though they still are, all are within the present boundaries of the Provinces of Quebec and Ontario.

May, 1919



SPIDERS FROM CANADA AND ADJOINING STATES.

NEW SPIDERS FROM CANADA AND THE ADJOINING STATES, No. 2.

BY J. H. EMERTON, BOSTON, MASS.

The first paper of this series was published in August, 1917, and described a number of spiders from the Pacific coast, eastern Canada and northern New York and New England, part of them collected in the summer of 1916. The present paper describes a few new species collected and identified from the same parts of the country since 1916. In addition to the new species, the male of *Pardosa vancouveri*, described in the paper of 1917, has been found, and its palpus is now figured. *Diplostyla canadensis* Emerton, described in Trans. Conn. Acad., 1882, from Montreal, has been again found, at Lake Tear on Mt. Marcy in the Adirondacks, N.Y., at an elevation of 4,500 feet.

Lophocarenum minakianum, n. sp.

Hardly 2 mm. long. Light brown with the legs and palpi and underside of the abdomen pale. The whole upper half of the abdomen is thickened and covered with small depressions in which are minute hairs. The head of the male has a hump which carries the posterior middle eyes. It is about as high as wide, and rises abruptly before and behind. It is rounded on top and has a slight groove in the middle, but is not as deeply divided as in *L. sculptum* Em., (Can. Ent., Aug., 1917,) which this species closely resembles. At each side of the hump is a deep groove as in *sculptum* and *excavatum*. The male palpus is much like that of *sculptum*, but the process on the top of the tarsus is longer and more narrowly pointed. (Pl. 7, Fig. 1, a and b.)

Minaki, Ontario. Sifted from leaf mould near Minaki Inn.

Ceratinopsis obscurus, n. sp.

Male 2 mm. long. Legs and cephalothorax yellow brown and the abdomen dark grey. The cephalothorax is nearly as wide as long and narrowed in front. The male palpi resemble those of *C. nigripalpis*, but the outer process of the tibia is wide and flat. The tarsus has, as in *nigripalpis*, a wide, thick ridge on the outer edge, at the side of which is a narrower groove. The palpal organ resembles that of *nigripalpis* and *nigriceps*. (Pl. 7, Fig. 2, a, b.)

In leaf mould in pine and birch woods at Minaki, Ontario.

Grammonata semipallida, n. sp.

Scarcely 2 mm. long. Legs pale, cephalothorax but little narrowed in front, pale on the hinder half and darker gray in front. The palpi are also dark grey. The abdomen is gray, pale in front and marked behind with alternate dark and light transverse spots. (Pl. 7, Fig. 3, a.) The male palpi are large and the tarsus round. The tibia has a short, blunt process extending over the tarsus, which has a distinct groove in which the process fits. The tarsal hook is curved in a half circle. The tube of the palpal organ is slender and abruptly curved backward in the middle. (Pl. 7, Figs. 3, b, c, d.)

Winnipeg, Manitoba, June, 1917. F. W. Waugh.

Diplostyla crosbyi, n. sp.

Male 4 mm. long. First femur 3 mm. Height of head and mandibles nearly equal to length of cephalothorax. (Pl. 7, Fig. 4, a.) The cephalothorax and legs are brown and the abdomen gray with light markings in pairs, as in *nigrina*. The tarsus of the male palpus is but little longer than wide. The tarsal hook has a sharp angle near the end and the terminal part is thin and flat and curved,

as if to fit against the convex side of the palpal organ. Near the base of the tarsal hook are several long hairs. The basal process of the palpal organ is not as straight as in *nigrina*, but is turned a little inward, as in *inornata*, (Pl.7, Fig. 4, b, c) and the narrow terminal half is flattened and slightly grooved in the middle.

Sifted from moss at 3,500 feet near the mouth of Uphill Brook, near Mt. Marcy, in the Adirondacks, N.Y. One male only.

Dictyna quadrispinosa, n. sp.

Male 2 mm. long. Colours and markings like *muraria*. The male palpi have the tibia wider than long. The usual two spines are sessile at the front edge of the tibia on the outer side, they are close together and curved down from the base and upward at the points. Behind the two spines is a ridge somewhat longer than the spines, ending in blunt points above and below.a (Pl. 7, Fig. 5, a, b.) The palpal organ is smaller than in *muraria*, and the tube and its supports more slender. (Pl. 7, Fig. 5, c.)

Black Brook, Clinton Co., N.Y., June, 1916. C. R. Crosby.

Pardosa vancouveri Emerton, Can. Ent., Aug, 1917.

The original description was of the female only, the male has since been found and resembles the female in size, colour and markings, with slightly longer legs and smaller abdomen. The male palpus (Pl. 7 Fig. 6) has the basal process very long and flattened and curved obliquely across the palpal organ. The whole palpus is very dark coloured and the details hard to see.

Near Lytton, B.C., from W. Taylor, Vancouver.

Amaurobius agelenoides, n. sp.

Female 9 mm. long. Male a little shorter and more slender. Colours pale yellow and brown in a distinct pattern on the back. The cephalothorax is brown with pale lateral stripes and a pale middle stripe half as wide as the head extending from the eyes to the dorsal groove. (Pl. 7, Fig. 1 a) The legs are pale with fine, dark hairs. The abdomen has a pale middle stripe divided in two in the front half and broken by several indistinct, dark middle spots behind. The rest of the abdomen is brown above and below without any other distinct markings. The upper spinnerets are twice as long as the lower pair, with the terminal joint conical and as wide as long. The cribellum is two-thirds as wide as the lower spinnerets and distinctly divided across the middle. The calamistrum is three-fourths as long as the fourth metatarsus, but does not show at all in the male, which also has the cribellum narrower and less easily seen than in the female. The epigynum is more open than in *sylvestris* and *pictus*, the middle lobe wide and dark coloured. (Pl. 7, Fig. 2 b.) The male palpus has two processes on the outer side of the tibia, which show best when seen from below. (Pl. 7,Figs. c, d.) The tarsus is twice as long as wide, widest near the base, and nearly straight on the inner side. (Pl. 7,Fig. d.)

Immature individuals have long been known, but only in the summer of 1918 were adults secured, the male by C. G. Hewitt at Jasper, and the female by N. B. Sanson at Banff.

Clubiona furcata, n. sp.

Male 4 mm. long. Pale with the abdomen reddish in alcohol. The size, eye arrangement, and length of legs resemble *C. abboti*. The male palpus has the tibia short with the long, outer process curved downward and outward with

a short fork at the end. (Pl. 7, Figs. 7, a.) The palpal organ, (Pl. 7, Figs. 7, b), is long and somewhat like that of *C. canadensis*.

Saskatoon, T. N. Willing.

Clubiona saltitans, n. sp.

Male 3 mm. long. Female 3.5 mm. Cephalothorax 1.5 mm. Colour pale, less red in alcohol than *C. abboti*. Eyes of the upper row in line with the front row and covering the whole width of the head. (Figs. 14, d.) Length of mandibles equal to width of head and slightly longer than in *abboti*. The male palpus resembles that of *abboti*, but is more slender and the outer process of the tibia has the lower branch one-half longer than the upper. (Figs. 14, a, b.) It has been found at several places near the seashore under stones and sticks on the sand. It sometimes jumps when pursued.

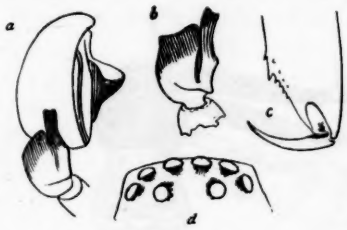


Fig. 14

This species has been confused with *C. abboti*. In general it is slightly larger, paler and more slender, and the tarsus of the male palpus is distinctly smaller. The mandibles are slightly longer, but the arrangement of the teeth is the same in both species. (Figs. 14, c.)

Ipswich, Plum Island and Wellfleet, Massachusetts.

Xysticus acquiescens, n. sp.

Male 5.5 mm. long. Legs very short, the first and second pairs 7 mm. long. The general colour is brown, the first legs a little darker and the palpi lighter than the rest. The cephalothorax has the light middle stripe much darkened with brown in the front half. The abdomen has the usual markings in pairs, the hinder pairs united into transverse stripes. (Pl. 7, Figs. 1, a.) The first and

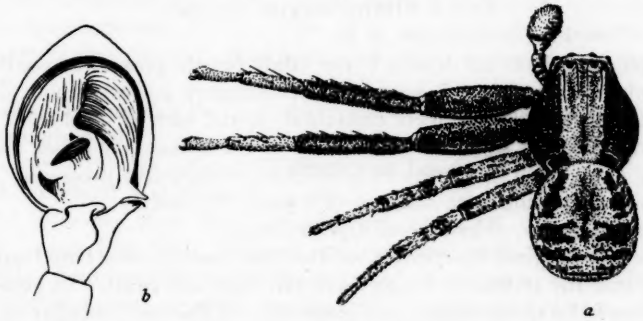


Fig. 15

second legs have the femur, patella and tibia darkly spotted with brown, and the tarsus and metatarsus a little lighter. The male palpus has the two processes of the palpal organ both small, the basal one simple and the distal one narrow at the base and thickened at the end where it curves toward the other. In front of the two processes is a wide, dark brown ridge. (Fig. 15, b.)

Saskatoon, T. N. Willing.

Xysticus ontariensis, n. sp.

Male 4 mm. long. First and second legs 9 mm. Cephalothorax dark brown, showing a middle stripe very indistinctly. The first and second legs have the femur and patella dark brown, and the rest of the leg pale. The third and fourth legs are spotted as usual but not very strongly marked. The abdomen has

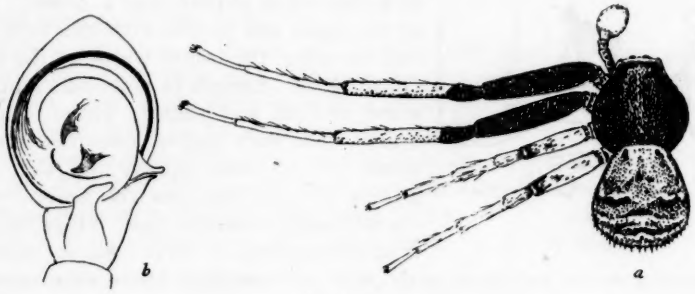


Fig. 16

two irregular brown patches on the front half, and three or four transverse stripes behind all with irregular outlines and variable colour. (Fig. 16, a.) The male palpus has the tibia white. The palpal organ has the two processes on the under side, simple hooks turned toward each other as in *X. gulosus*, with which this species has been confused. (Fig. 16, b.)

Cloyne, Ontario, A. B. Klugh; Wellesley, Massachusetts.

NOTES ON COCCIDÆ—III. (HEMIPTERA).*

BY G. F. FERRIS, STANFORD UNIVERSITY, CALIFORNIA.

Continued from Can. Ent., vol. 50, p. 332.

Genus **Stigmacoccus** Hempel.

1903. Fernald, Cat. Coccidæ, p. 20.

Monophleboid Coccidæ in which the adult female possesses mouth-parts, legs and antennæ, the latter 7–8-segmented; immature stages without legs and with the antennæ reduced to mere chitinized points, with an anal tube formed by the chitinization of the posterior portion of the alimentary canal, this tube terminating at its inner extremity in a series of tentacle-like processes. Abdomen in adult and penultimate stages with 8 pairs of spiracles.

Type of the genus, *Stigmacoccus asper* Hempel.

Notes.—The original description of the type species was based upon the adult alone and the immature stages have not been described. In general the genus appears to be quite similar to *Xylococcus*, but the very peculiar character of the anal tube alone seems sufficient grounds for its separation.

Whether the genus *Perissopneumon* Newstead is a synonym of *Stigmacoccus*, as Cockerell has indicated, is perhaps doubtful.

Stigmacoccus asper Hempel.

Fig. 17.

Penultimate stage. Enclosed in a test, as described by Hempel for the adult female. Body more or less spherical, with the anal opening high up on the dorsum. Derm membranous throughout, except for a small, circular,

chitinized area surrounding the base of the anal tube, everywhere beset with small, spike-like spines. Legs lacking. Antennæ reduced to mere chitinized points. Anal tube of a very distinctive type (Fig. 17A), its inner end terminating in a series of tentacle-like processes (in my single specimen 7 in number), these processes and the tube itself thickly beset with pores. Dermal pores of three types. Of these, one (Fig. 17B) is more or less 8-shaped, with one of the loculi

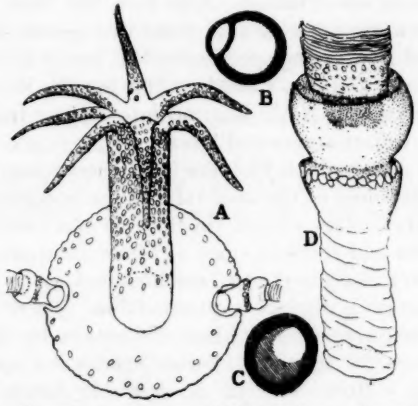


Fig. 17.—*Stigmacoccus asper* Hempel. A, anal tube, with chitinized area and spiracles at its base; B, 8-shaped pore; C, simple pore, from clusters about spiracles; D, spiracle, external opening at lower end.

much smaller than the other. Another resembles the first in shape, but is much smaller and is borne at the inner end of a short duct. The third (Fig. 17C) appears as a simple ring with the enclosed area partially chitinized. The pores of the last type form clusters about the spiracles; those of the first two types are scattered about over the body. Eight pairs of abdominal spiracles present, all of the type indicated in Fig. 17D. The last abdominal pair are situated at the edge of the circular, chitinized area which surrounds the base of the anal tube.

Material examined. Part of the type material, this including a single immature individual.

Genus **Xylococcus** Loew.

1903. Fernald, Cat. Coccidæ, p. 32.

1917. Florence, Ann. Ent. Soc. Am., vol. 10, p. 147.

This genus has been assigned by previous authors to the subfamily Margarodinæ because of the supposed absence of mouth-parts in the adult female. I have at hand a series of adult females of *X. macrocarpæ* Coleman, and in this series practically every stage from a complete absence of mouth-parts to mouth-parts which are to all appearances functional is represented. It appears from this series that the foundations of the mouth-parts are probably always present, but that in some instances they do not become chitinized.

I have not observed mouth-parts in the adult females of other species of *Xylococcus*, but the number of specimens examined is small, and it is not at all improbable that the examination of a long series would reveal conditions similar to those found in *X. macrocarpæ*.

It is becoming increasingly evident that the distinction heretofore drawn

between the Monophlebinæ and the Margarodinæ on the basis of the presence or absence of the mouth-parts in the adult female cannot be maintained.

Xylococcus betulæ Perg.

1898. *Xylococcus betulæ* Pergande, U. S. Dept. Agric., Div. Ent., Bull. 18, n. s., p. 18.

1917. *Xylococcus alni* Florence, Ann. Ent. Soc. Am., vol. 10, p. 158.

There is, I think, no question that these two species are identical. I have at hand the types of *X. alni* and specimens of *X. betulæ* as follows: from "cherry birch," Port Colborne, Ontario, Canada, adult female, intermediate stages and larva; from beech, Ithaca, N.Y., intermediate stages; from beech, Michigan, adult female, intermediate stages and larva.

The characters used by Miss Florence for the separation of *X. alni* are hardly sufficient. The differences in the anal tube of the apodous stages are not constant. The first larval stage of *alni* (in the two specimens examined) has 6–7 median ventral pores and the first stage of *betulæ* (in numerous specimens) has but 5, but in all other respects the two are identical.

Whether *X. quercus* is distinct is questionable. There appear to be certain differences in the first stage, but if these differences be allowed as of specific value it will be necessary to name another species for specimens taken from *Quercus californicus*. More material is desirable before forming any conclusions.

X. macrocarpæ Coleman is very distinct. I would separate this from *X. betulæ* by the following characters:

Adult female with the derm of the dorsum practically destitute of spines; anal tube of apodous stages with pores at the inner end only; marginal pores of first stage sessile, *X. macrocarpæ* Coleman.

Adult female of the dorsum everywhere quite thickly beset with slender spines; anal tube of apodous stages with pores both at the inner end and near the base; marginal pores of first stage borne at the inner end of short ducts.....*X. betulæ* Pergande.

Genus **Kuwania** Ckll.

1903. Fernald, Cat. Coccidæ, p. 30.

1909. Cockerell, Can. Ent., vol. 41, p. 56.

Monophleboid Coccidæ in which the adult female appears normally to lack mouth-parts but with the legs and antennæ present; tarsal claw without digitules, the tibia with numerous digitule-like hairs on the inner side at its apex; intermediate stages without legs and with the antennæ reduced to mere chitinized points, anal tube lacking. Four pairs of abdominal spiracles present in adult and penultimate stages, these on the anterior segments of the abdomen.

Type of the genus *Kuwania quercus* (Kuwana).

Notes.—I am inclined to doubt that *K. zeylanica* (Green) is congeneric with *K. quercus*. The immature stages have not been described, and it is upon these that the matter will largely depend, the adults of all of these forms being quite similar. I have at hand an adult female of *K. zeylanica* which differs from the same stage of *K. quercus* in having well-developed mouth-parts with a distinct mentum, and in having 6-8 pairs of abdominal spiracles.

Kuwania quercus (Kuwana).

Fig. 18

1903. Fernald, Cat. Coccidæ, p. 30..

1917. Ferris, Can. Ent., vol. 49, p. 377, fig. 39b.

The general characteristics of the adult female have been described by Kuwana, but there remain certain points of interest. The mouth-parts appear really to be lacking as they are absent in all of numerous preparations examined It is not impossible, however, that further examination would reveal a condition similar to that found in *Xylococcus macrocarpæ*.

There are four pairs of abdominal spiracles (not noted by Kuwana), these of the type shown in Fig. 18. D.

Penultimate stage. Oval in form (Fig. 18C). Antennæ reduced to more chitinized points. Spiracles arranged as in the adult but of a quite different

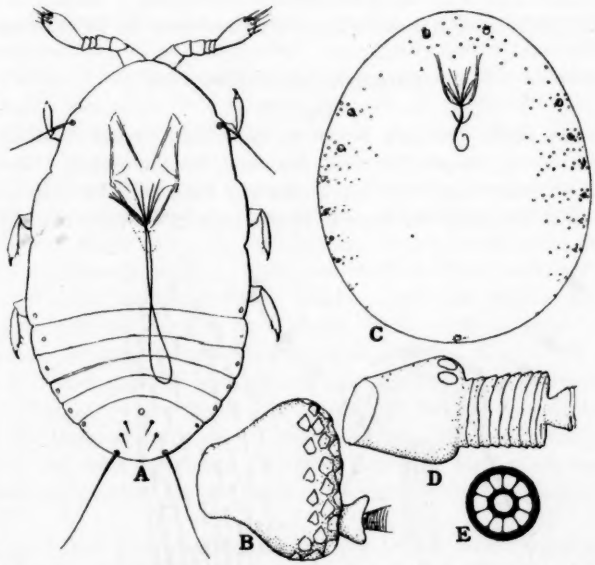


Fig. 18.—*Kuwana quercus* (Kuwana). A, larva; B, spiracle of apodous stage C, apodous stage; D, spiracle of adult; E, pore of apodous stage.

form (Fig. 18B). Margins of the body with large, circular pores (Fig. 18E), these most numerous toward the head. Anal opening simple, without an anal tube.

First stage larva. (Fig. 18A). The description given by Kuwana appears to be accurate except for the statement, "Margins of the body with capitate hairs." These hairs do not appear in my specimens. The larva is so minute that I have been unable to detect the arrangement of the spiracles, or, indeed, whether or not they are present. Each abdominal segment bears at the margin a small object that may be either a pore or a spiracle.

Material examined. Preparations from the type material.

Genus **Cissococcus** Ckll.

Coccidæ referable to the subfamily Coccinæ. Adult female with the anal plates borne at the apex of a low prominence, their dorsal surface beset with numerous small spines; antennæ and legs present but extremely small; stigmatic depressions apparently lacking, their presence not indicated by differentiated spines. First stage larva likewise without differentiated stigmatic spines.

Type of the genus *Cissococcus fulleri* Ckll.

Notes.—The original description of this genus is much in error. The author states, "Belongs to the Eriococcini. *Larva* typically Eriococcine, with rows of dorsal spines. . . *Adult* . . . with a pair of plates simulating those of the Lecaniinæ." The larva is in all respects of the type usual in the Coccinæ (=Lecaniinæ) and is entirely without dorsal spines. The anal plates of the adult are very much of the type seen in *Ceroplastes*, except for the numerous spines on the dorsal surface. In spite of the gall-making habit the genus is indeed possibly close to *Ceroplastes*.

The species described by Ehrhorn as *Cissococcus ? oahuensis* has nothing to do with *C. fulleri* and has quite properly been referred by its author to a new genus.

Cissococcus fulleri Ckll.

Fig. 19.

My single adult specimen is not in sufficiently good condition to permit adding much to the description already given for the genus. The anal plates (Fig. 3C) are rather long, the lateral margin rounded, the tips quite pointed, resembling in this respect the type of plates seen in Ceroplastes. There appear

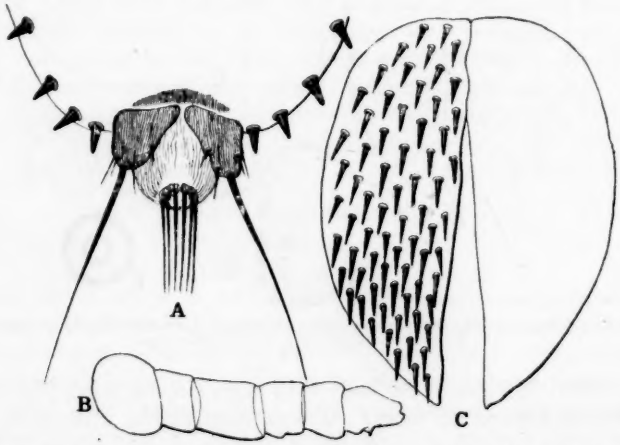


Fig. 19.—*Cissococcus fulleri* Ckll. A, posterior extremity of abdomen of larva, showing the eversible anal tube, which is characteristic of the Coccinae; B, antennæ of larva, setæ not indicated; C, anal plates of adult, spines of dorsal surface indicated in but one plate.

to be no marginal spines. The antennæ are extremely minute, with the number of segments undeterminable; the legs are likewise very small but possess the normal parts.

The first stage larva bears a marginal series of short, stout spines (Fig.

19A); the antennæ are 6-segmented, rather short and stout; there are no dorsal spines.

Material examined. Part of the type material.

Corrections to Earlier Papers.

In my description of *Stomacoccus platani* (2) the caption for Fig. 38B has been omitted. This is the antenna of the prepupa of the male. On page 376 it is stated that the antennæ of the prepupa of the male are 8-segmented, while the figure shows 9 segments. The figure is correct.

In the redescription of *Cryptokermes brasiliensis* Hempel (3), the second line on page 222 reads in part, "posterior portion of anal ring." This should read, "posterior portion of alimentary canal."

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*THREE NEW SPECIES OF BRACONIDÆ.

BY C. F. W. MUESEBECK, ITHACA, N.Y.

Apanteles phigaliæ, n. sp.

Female.—Length 2.2 mm. Black, shining. Head transverse, broad; mandibles reddish brown; palpi yellowish; face slightly convex, medially punctate, and with a distinct median ridge originating between the antennæ; antennæ black. Mesoscutum closely punctate; scutellum distinctly but shallowly punctate, slightly convex; both mesoscutum and scutellum shining. Mesopleura punctate cephalad and ventrad, and with a large, shallow, perfectly smooth and highly-polished area posteriorly, which does not possess the crenulate fovea common to many species of the genus. Propodeum smooth and shining, with a number of short radiating striulæ extending upward from the middle of the posterior margin; no median carina nor median fovea present.

Wings.—Tegulæ and wing-bases black; veins and stigma brown; radius and transverse cubitus meeting in a sharp angle, with a distinct heel at the point of union, the two veins about equal in length. Legs.—All coxæ black, the posterior rather smooth, above with a basal elongate-oval flattened shining area, which has a few scattered punctures; all trochanters dusky; fore and middle femora somewhat dusky at extreme base, the hind femora dusky at extreme base and apex and along the upper edge, the hind tibiæ dusky at apex, and the hind tarsi, except on the basal two-thirds of the basal segment, entirely dusky.

Abdomen black and shining, moderately broad; first tergite almost twice as long as broad at base, parallel-sided, and rounded off very strongly at apex so that apex is much narrower than base, almost entirely smooth and polished, only the extreme apex being weakly punctate; plate of second dorsal segment triangular, very narrow at base, and three times as broad as apex as at base, three-fourths as long down the middle as broad at apex, and very slightly, or not at all, shorter than the third plate; the basal middle of this plate is smooth and polished, while the apical margin and the apical angles are finely rugulose. The membranous margins along the apical half of the first tergite and all of the second are fuscous, and exceedingly broad along the second plate, the mem-

2. Canadian Entomologist, vol. 49, p. 375-378, figs. 36 to 39, (1917)
3. Canadian Entomologist, vol. 50, p. 221-225, (1918)

*Contributions from the Gipsy Moth Laboratory, United States Bureau of Entomology, Melrose, Highlands, Mass.

branous portion on either side of this plate being almost as large as the plate itself. Segment three and beyond smooth and shining. Ovipositor subexserted.

Male.—Like the female except for the usual sexual differences.

Type locality.—Melrose Highlands, Mass.

Type.—Gip. Moth Lab. No. 12007N-16. Deposited in U. S. Nat. Mus. Type No. 22095 U. S. N. M.

Host.—*Phigalia titea* Cram.

Described from 21 specimens (13 females; 8 males) bred by Mr. R. T. Webber, of the Bureau of Entomology, at the Gipsy Moth Laboratory, Melrose Highlands, Mass., from nearly full-grown larvæ of the above species, June, 1916, the adult parasites issuing the following spring.

Cocoons are light brown in colour, parchment-like, and have about eight strong, regular, longitudinal ridges; they are broader at the anterior end and taper considerably toward the posterior end; they resemble somewhat the cocoons of some species of the closely-allied genus *Microplitis* Foerst., especially those of *M. gortynæ* Riley, but are much smaller. Although this species of Apanteles is gregarious the cocoons are not fastened together, but are formed individually on the back of the caterpillar.

The species resembles somewhat *Apanteles feltiæ* Vier., but differs as well in the paler stigma and lighter legs as in the second abdominal tergite being considerably longer in proportion to its width at the apex.

Apanteles compressus, n. sp.

Female.—Length 2 mm. Black, shining. Head transverse; face punctate, slightly broader than long; palpi yellowish white; antennæ yellowish-brown on scape and basal third of flagellum, darker on apical two-thirds; apical flagellar segments of antennæ broad, almost as broad as long and broader than the basal segments. Mesoscutum and scutellum closely punctate, the latter somewhat less so medially, only slightly shining; scutellum narrow, distinctly longer than broad at base, very slightly convex. Mesopleura punctate and dull anteriorly and below, smooth and polished above and posteriorly, where there is a long, narrow, finely crenulate, longitudinal channel. Propodeum very finely rugose, the posterior angles deeply sunken and shining; a very weak suggestion of a median carina on the propodeum.

Wings.—Tegulæ and wing-bases black; stigma and veins brown; radius and transverse cubitus forming a rather uniform arc, without the sharp angulation at the point of union as found in many species of the genus. Legs.—Fore and middle legs entirely yellowish; hind coxæ black, smooth and shining, having only a few distinct punctures at base above; hind trochanters and femora yellow, except the upper edge of the femora dusky on the apical two-thirds; hind tibiæ blackish except on basal fourth, where they are yellowish; hind tarsi dusky except at base of basal segment; spurs of the hind tibiæ not one-half as long as the metatarsus.

Abdomen black, shining; very narrow, being greatly compressed at apex; first tergite long, narrow and parallel-sided, twice as long as wide at base and narrower at apex than at base, very finely rugulose, feebly striate at extreme sides; second tergite triangular, only one-half as broad at base as long down the middle, and three times as broad at apex as at base, almost entirely smooth and polished, only the apical angles finely rugulose, this rugosity extending toward

middle along the margin; membranous margins along apical third of first plate and all of the second, broad, dark testaceous; third tergite and beyond very smooth and shining; ovipositor subexserted.

Males.—Agrees well with the female except for the usual sexual differences.

Type locality.—Lunenburg, Mass. Cocoon mass with the host larva firmly attached collected by Mr. S. M. Dohanian, of the Bureau of Entomology. Paratype localities.—Exeter, N. H.; Pelham, N. H.; Bristol, R. I.

Type.—Gip. Moth Lab. No. 10697AK. Deposited in U. S. Nat. Mus. Type No. 22094 U. S. N. M.

Host.—Evidently a species of *Hypoprepia.*

Described from 24 specimens (13 females; 11 males) bred at the Gipsy Moth Laboratory, Melrose Highlands, Mass.

Cocoons are pure white, thin, clustered together, and usually firmly cemented to the under side of the host caterpillar.

Resembles very closely *A. sarrothripæ* Weed, but the latter has a much less punctate and a highly polished mesoscutum and scutellum; the apical flagellar segments of the female antennæ are much longer than broad and much more slender than in the present species; the hind coxæ are reddish black rather than black; and the abdomen has more or less reddish on the segments posterior to the second, while in the present species the dorsum of the abdomen is entirely black; also, the venter of the abdomen is more testaceous in *sarrothripæ*, and the second abdominal tergite is broader at base so that the lateral margins are less oblique; the venation of the anterior wings also differs, in that the radius and the transverse cubitus meet in a sharp angle in *sarrothripæ*. From the species *phigaliæ*, described above, *compressus* may be distinguished by the much narrower and more compressed abdomen, by the yellowish fore and middle coxæ, by the rougher propodeum, and by the cocoons.

Meteorus triangularis, n. sp.

Female.—Length 5 mm. Head yellowish; eyes black; antennæ yellowish red; stemmaticum black. Prothorax, meso- and metapleuræ yellowish red; mesonotum yellow except the lateral lobes, which are black; scutellum yellow; postscutellum blackish; propodeum black, except the apical angles, which are reddish.

Legs entirely yellowish, except the hind tibiæ, which have a dusky annulus near the base and another at the apex, and the hind tarsi, which are dusky. Wings hyaline, stigma and veins brownish, the stigma without the dark spot found in some species of the genus; the recurrent vein interstitial with the first transverse cubitus; tegulæ and wing-bases yellow.

Abdomen blackish brown above, except the extreme base of the first tergite, which is yellowish, and a yellowish-brown triangular spot at the base of the second tergite, which extends across the entire plate, but is very narrow laterally; the first tergite is longitudinally aciculated on the apical two-thirds or more, which part is black in colour; the deep fossæ, which are found on the upper side of the petiole of a number of species of Meteorus, are wanting in this form. Ovipositor half the length of the abdomen.

Male.—Resembles the female except for sexual differences.

Type locality.—Mass. (?)

Type.—Gip. Moth Lab. No. 6988-1. Deposited in U. S. Nat. Mus. Type No. 22096 U. S. N. M.

Described from eight specimens (4 females; 4 males) reared at the Gipsy Moth Laboratory, Melrose Highlands, Mass. A note in the files at the Gipsy Moth Laboratory, and relating to these specimens, reads, "from a geometrid tray, July 7, 1914."

Cocoons pale brownish, very similar to those of *M. communis* Cress. in colour, density and size.

Rarely the abdominal tergites beyond the first are largely brownish yellow, instead of blackish brown, as in the type specimen.

A NEW COCCID ON THE COCOANUT PALM.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

Mr. R. C. McGregor, of the Philippine Bureau of Science, recently visited the Island of Batbatan, from which, so far as I can learn, no insects have previously been obtained. Among the various things he found, the following is perhaps the most interesting.

Furcaspis hæmatochroa, sp. n.

Female scales on leaves of cocoanut palm, scattered. Scale deep rich red, suggesting a drop of blood; circular, slightly convex, with the large, circular exuviæ to one side, often reaching or slightly overlapping the margin, first skin nipple-like, prominent; width of scale about 2.5 mm. Male scales suboval.

Female without circumgenital glands; in form and details of structure closely resembling *F. oceanica* Lindinger, but distinguished by the broad, squarely

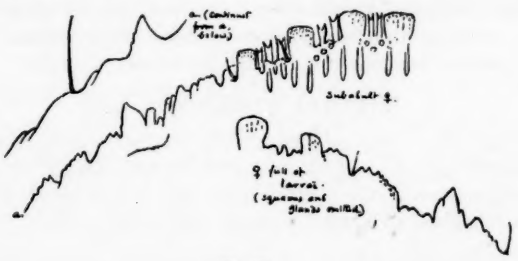

Fig. 20

truncate lobes, the bidentate (not tridentate) squames, and the very prominent pointed elevations on the abdominal margin between the lobes proper and the long, lateral bristle. The details of structure are better indicated by a figure than described. Larvæ in female very large, length about 360 microns. Batbatan Island, Antique Province, Panay, P.I.; June 30, 1918, (*McGregor*). The scale of *F. oceanica* also differs in being suboval instead of circular.

From *F. capensis* (Walker), the new species is known at once by the bifid or bidentate end of the squames and the very broad lobes. It also lacks the series of long hairs found on the cephalothorax of *capensis*. From *F. cladii* (*Aspidiotus cladii* Maskell) it is equally distinguished by the form of the squames, as well as the lateral dentiform process of the abdomen. The lateral dentiform processes are developed in *F. biformis* (Ckll.), which occurs on orchids; but that has a much darker scale and is otherwise different.

May, 1919

A METHOD FOR THE PRESERVATION OF INSECT LARVÆ AND PUPÆ.

BY F. SLATER JACKSON, M.D., MCGILL UNIVERSITY, MONTREAL.

During the summer of 1916 the writer devised a method (as yet unpublished) for the preservation of fresh-water Bryozoa in an expanded condition. At that time, as a matter of experiment, several larvæ and pupæ of *Nymphula maculalis* were placed in the fluid employed for this purpose, with fairly satisfactory results. It was subsequently used for the preservation of insects in all stages. Among these were the larvæ of *Mamestra picta* and other Lepidoptera, and the pupæ and imagines of *Physonota unipuncta*, all of which seem to have retained satisfactorily their form and colour.

Several members of the Montreal branch of the Entomological Society, among others, Mr. A. F. Winn and Mr. Geo. A. Moore, obtained good results with the same fluid. In a letter of February 28th, 1918, Mr. Arthur Gibson, Chief Assistant Entomologist, writes: "I used it rather freely for preserving larvæ of different kinds. . . . I have also spoken of its value to several of our field officers. I hope very much that you will publish your formula soon, as I know many workers will find it of value." These encouraging reports led to further experiment, with the view of obtaining a modification of this fluid which might prove more widely useful as a preservative for material of this character.

It had been found that in many instances, e. g., in the case of large Lepidopterous larvæ, there was frequently marked alteration or loss of colour, and a considerable degree of shrinkage. Pressure of other work, however, and a period of incapacity for concentration of effort, led to the postponement of this matter, until during the past summer opportunity was afforded for further experimentation, which resulted in the provisional adoption of the following method.

The specimens, having been killed in the cyanide bottle, or by means of chloroform vapour, are allowed to relax, straightened if necessary, and placed in a fluid having the following composition:—

Fluid a.

Cane sugar	10 parts
Glacial Acetic acid	5 "
Formalin	2 "
Distilled water to	100 "

The sugar is to be dissolved in the water, and the acetic acid and formalin subsequently added.

In this fluid the specimens are allowed to remain for about 24 hours. They are then transferred directly to *Fluid b.*, which is identical in composition except that the acetic acid is omitted—it being, in fact, simply a 10% solution of sugar in 2% formalin. After about 24 hours this fluid should be changed, and in the case of large specimens a further renewal after the lapse of a week or ten days is advisable, since traces of acetic acid tend, in some instances, to destroy colour.

Attention to the following details may be of assistance in obtaining the best results.

1. In the case of specimens which tend to float, on account either of an oily surface, or through the accumulation of air bubbles (as e. g. in Arctiids, etc.) a preliminary immersion for a few moments in 70% or 90% alcohol will be found to facilitate their contact with and penetration by the fluid.

2. In dealing with large or transparent larvæ, it is well to starve the specimens for a few hours before killing, in order that the alimentary canal may be emptied of its contents. For this suggestion I am indebted to Mr. A. F. Winn.

3. In the case of elongated larvæ, if tubes be employed, they should be almost completely filled with the fluid A., and then allowed to lie horizontally until the transfer to fluid B. is made.

While it is not claimed that the above method is applicable to all forms, or that all colours will be permanently preserved, it has yielded good results in the hands of the writer, and in those of the gentlemen who have so kindly, at his suggestion, given it an extended trial. Larvæ of widely-differing types, such as the following, have been satisfactorily preserved:—various Arctiids and Geometrids, *Euvanessa antiopa*, *Datana* spp., and *Nymphula maculalis*, together with numerous Coleopterous larvæ and the nymphal stages of a number of Hemiptera.

In any event the method is one of easy application, and the ingredients for the preparation of the fluid are cheaply and easily obtainable. No more satisfactory means of preserving insect larvæ and pupæ is known to the writer, by whom this note is submitted in the hope that the method, while admittedly not of universal application, will be found to be of service, and by whom any reports of its successful employment, or suggestions as to its modification, will be gratefully received.

Zoological Laboratory, McGill University, Oct. 29, 1918.

NOTE ON *CHALEPUS NERVOSA* PANZ. AND ITS PROBABLE FOOD PLANT.

The reading of the "Notes on *Chalepus rubra* in New Jersey," published in the December number of the Canadian Entomologist, has prompted me to give a short account of a somewhat similar observation I made last Spring on *Chalepus nervosa* Panzer, the only one of the five recorded Canadian species that I have taken in this Province.

On May 16th, 1918, while doing some outdoor entomological work in that part of Montreal mountain bordering the grounds of the Outremont Golf Club, I noticed that every time the sweeping net was being emptied of its contents, a good supply of this little beetle could be dropped into the killing bottle. The thought struck me of finding out which plant they were being swept off. An active search was then made all around, which soon gave me the desired result The slow, harmless little being was found in colonies of four, eight or more on the leaves of *Solidago latifolia* L., then but a few inches tall. Some of the plants sheltered no less than a dozen specimens. As it was surely mating time, one would have been able to take hundreds of them in an hour. Never before had I met them in such numbers.

They are most easily taken with the hand, provided you do not touch the plant before seizing the insect; a jerk of the stem will bring down the whole

colony to the ground, where they will lie motionless and quite invisible, so that you had better give up looking for the tricky little creature.

No further observations have been made on the habits of the insect, nor have I even seen the larva or the eggs. So we may still doubt if *Solidago latifolia* be really the food-plant of *Chalepus nervosa*. This question might be elucidated next season, and it would also be interesting to find out what sort of damage the beetle causes to the foliage of this handsome wood Goldenrod.

Blatchley, in his work on the Coleoptera of Indiana, says that *Chalepus nervosa* occurs on weeds and bushes of many kinds. So far, I have not seen the beetle crawling in number over any plant except *Solidago latifolia*.

Is it not strange that the discovery was made only after more than twenty years of very active collecting?

Outremont, Que., Jan. 11th, 1919. JOS. OUELLET, C.S.V.

A NEW PARAJULUS FROM BRITISH COLUMBIA.

BY RALPH V. CHAMBERLIN, CAMBRIDGE, MASS.

In a small collection of Chilopods and Diplopods collected by Dr. C. Gordon Hewitt in British Columbia, Sept., 1918, were several specimens of a new species of Parajulus. These were collected at Agassiz. From the same locality were also secured representatives of *Harpaphe haydeniana* (Wood) and *Bothropolys hoples* (Brölemann). A specimen of *Paobius orophilus* Chamberlin, previously known from Kaslo, was taken at Jaspa, Goat Mountain, at an elevation of 7,000 feet.

Parajulus hewitti, sp. nov.

The general colour of the female is brown above with the sides paler, a series of small, black spots along each side caused by the black repugnatorial

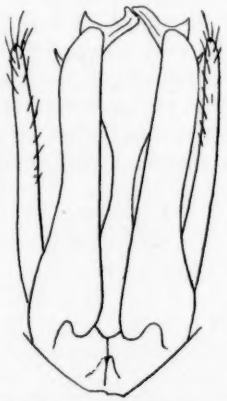

Fig. 21.—*Parajulus hewitti*, sp. n. Anterior view of gonopods of male.

glands. The male is darker in colour throughout. The posterior border of metazonites darker down the sides or in the form of an encircling annulus. Anal valves dark. Collum dark along the borders, the remaining portion covered with a dense network of dark lines as is frequent, such also covering the

vertex of the head which is dark excepting the clypeal region. Antennæ brown. Legs yellow.

In the male the second tergite extends much below the level of the collum and is angularly produced below at anterior corner. In the male the second tergite is on the same level below as the collum. The collum is more elongate than in the female, as usual, and the longitudinal stria above the lateral border is strongly marked. On each side of the second tergite below are typically three longitudinal striæ in the male.

The cardo of mandibles of the male is large. It is concavely excavated below, leaving a larger angular anterior process and a smaller posterior one.

Segmental suture in a well-impressed encircling groove, widely curved opposite the pore from which it is well removed.

Cauda of anal tergite straight, caudally rounded, decidedly exceeding the valves in both sexes.

First legs in male strongly crassate and uncate as usual.

The species is most readily to be distinguished by the structure of the gonopods of the male, particularly by the form of the second pair. These are distally branched, presenting two acute spurs, visible in anterior view, projecting from beneath the plate of the first pair, one of them being apical, and a larger mesal principal branch which curves mesad against the corresponding branch of the other gonopod as shown in the accompanying figure.

Number of segments mostly forty-six or forty-seven.

Length near 27 mm.

OVIPOSITION OF *RHINOGASTROPHILUS NASALIS* L.

Referring to Mr. A. E. Cameron's article in *Science* for January 3, 1919, p. 26, I would insist that my observations, as recorded in *Can. Ent.* for July, 1918, are absolutely correct. In repeated instances I saw the fly strike at the muzzle of the horse just as I have described. While the egg of *nasalis* is easily to be distinguished from that of *intestinalis*, I still maintain that both are "practically the same size and shape" as compared with that of *haemorrhoidalis*. I also still believe that my tentative conclusions as to the method of oviposition are extremely probable. As to the observations recorded, they are not inaccurate in any sense.

C. H. T. TOWNSEND.

Mailed May 20th, 1919.